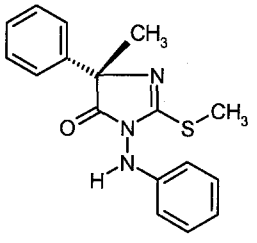
**Data Evaluation Report on the adsorption-desorption of fenamidone in soil**

PMRA Submission Number {.....} EPA MRID Number 45385823

**Data Requirement:** PMRA Data Code:
EPA DP Barcode: D275213
OECD Data Point:
EPA Guideline: 163-1

**Test material:**
Common name: Fenamidone
Chemical name
IUPAC: (+)-(4*S*)-4-Methyl-2-methylthio-4-phenyl-(1H)-1-phenylamino-2-imidazolin-5-one.
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-, (*S*)-.
CAS No: 161326-34-7.
Synonyms: Reason 500 SC Fungicide.
Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydro-4H-imidazol-4-one.
(*S*)-1-Anilino-4-methyl-2-methylthio-4-phenylimidazolin-5-one.
(*S*)-5-Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydroimidazol-4-one.
Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-, (5*S*)-.
(5*S*)-3,5-Dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-4*H*-imidazol-4-one.
RPA407213.
SMILES string:

Chemical Structure:




**Primary Reviewer:** Dana Worcester
Dynamac Corporation
**Signature:** Signed by Dynamac's reviewer
**Date:** on 3/8/02

**QC Reviewer:** Joan Harlin
Dynamac Corporation
**Signature:**
**Date:**

**Secondary Reviewer:** Silvia Termes
EPA
**Signature:**
**Date:** 26 August, 2002

**Data Evaluation Report on the adsorption-desorption of fenamidone in soil**

PMRA Submission Number {.....} EPA MRID Number 45385823

**Data Requirement:** PMRA Data Code:
EPA DP Barcode: D275213
OECD Data Point:
EPA Guideline: 163-1

**Test material:**
Common name: Fenamidone
Chemical name
IUPAC: (+)-(4*S*)-4-Methyl-2-methylthio-4-phenyl-(1H)-1-phenylamino-2-imidazolin-5-one.
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-, (*S*)-.
CAS No: 161326-34-7.
Synonyms: Reason 500 SC Fungicide.
Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydro-4H-imidazol-4-one.
(*S*)-1-Anilino-4-methyl-2-methylthio-4-phenylimidazolin-5-one.
(*S*)-5-Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydroimidazol-4-one.
Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-, (5*S*)-.
(5*S*)-3,5-Dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-4*H*-imidazol-4-one.
RPA407213.
SMILES string:

**Primary Reviewer:** Dana Worcester
Dynamac Corporation
**Signature:** Dana Worcester
**Date:** 3/8/02

**QC Reviewer:** Joan Harlin
Dynamac Corporation
**Signature:** Joan L Harlin
**Date:** 3/8/02

**Secondary Reviewer:** Silvia Termes
EPA
**Signature:**
**Date:**

**Company Code:** [for PMRA]
**Active Code:** [for PMRA]
**Use Site Category:** [for PMRA]
**EPA PC Code:** 046679

**CITATION:** Burr, C.M. 1998. [$^{14}$C]-RPA 407213 : Adsorption/desorption to and from four soils and a sediment. Unpublished study performed and sponsored by Rhône-Poulenc Agriculture Ltd., Essex, UK. Laboratory Project ID. 10611. RPA Document 201654. Study initiated June 13, 1997 and completed April 29, 1998.

**Company Code:** [for PMRA]
**Active Code:** [for PMRA]
**Use Site Category:** [for PMRA]
**EPA PC Code:** 046679

**CITATION:** Burr, C.M. 1998. [$^{14}$C]-RPA 407213 : Adsorption/desorption to and from four soils and a sediment. Unpublished study performed and sponsored by Rhône-Poulenc Agriculture Ltd., Essex, UK. Laboratory Project ID. 10611. RPA Document 201654. Study initiated June 13, 1997 and completed April 29, 1998.

**Administrative Conclusions:** This study is classified acceptable and may be used to satisfy the 163-1 the guideline requirement for an adsorption/desorption study of fenamidone in soil and sediment.

## EXECUTIVE SUMMARY:

The adsorption/desorption characteristics of [N-phenyl-U-$^{14}$C]fenamidone [(S)-4-methyl-2-methylthio-4-phenyl-1-phenylamino-5(4H)-imidazolone] was studied in a silt loam soil [pH- 6.2, organic carbon - 0.5%] and sandy loam soil [pH - 6.7, organic carbon - 1.2%], each from the U.S., and a loam soil [pH - 7.0, organic carbon - 2.2%], silt loam soil [pH - 8.1, organic carbon - 1.9%] and sandy clay loam sediment [pH - 8.2, organic carbon - 2.3%], each from the UK, in a batch equilibrium experiment. The experiment was conducted in accordance with the U.S. EPA Pesticide Guidelines Subdivision N, 163-1 and OECD Guidelines for Testing of Chemicals, "Adsorption/Desorption", Guideline 106 (May, 1981), and in compliance with the GLP standard 40 CFR Part 160 and OECD-GLP. The adsorption phase of the study was carried out by equilibrating air-dried soil and sediment with fenamidone at nominal concentrations of 17.5, 3.5, 0.7, 0.14 mg a.i./kg at 20 ± 2°C for 48 hours in the dark. The equilibrating solution used was 0.01 M $CaCl_2$, with soil/solution ratios of 1:5 (w:v) for all four soils and one sediment. The desorption phase of the study was carried out by replacing the adsorption solution with an equivalent volume of sterilized, pesticide-free 0.01 M $CaCl_2$ solution and equilibrating in the dark for 1.5 hours at 20°C. The desorption step was repeated four times.

The supernatant solution after adsorption and desorption was separated by centrifugation and triplicate aliquots were analysed for total radioactivity using LSC. Following the final desorption, one sample of each soil and sediment was extracted and triplicate aliquots were analyzed by LSC. Radioactivity in the soil residue after the final desorption and extraction was determined by combustion. Aliquots (0.1-0.3 g) of the soil were combusted and analyzed by LSC.

HPLC analysis of supernatants from the soil residues indicated that fenamidone was relatively stable in the test solutions during the adsorption/desorption phase of the experiment; ≤2.53% of the applied radioactivity degraded. Supernatants analyzed by HPLC were from the high treatment concentration (four soils) or from the mid-high treatment concentration (sediment) concentration. The mass balance was not reported at the end of adsorption phase of the study. The complete mass balance (adsorption and five desorption steps) was 93.01%, 92.01%, 91.34%, 94.61% and 93.10% of the applied for the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment and Panholes silt loam soil, respectively.

After 48 hours of equilibration, 29.6-58.7%, 51.2-86.6%, 59.0-78.5%, 64.0-74.3%, and 47.8-75.3% of the applied fenamidone was adsorbed to the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively (reviewer-calculated). Freundlich $K_{ads}$ values were 2.43, 5.93, 6.89, 8.90, and 4.93 for the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively. Corresponding adsorption $K_{oc}$ values ranged from 259 to 494. At the end of five desorption phases, 43.96-74.69%, 14.50-54.74%, 46.92-67.54%, 58.93-68.12%, and 30.91-57.48% of the adsorbed amount was desorbed from the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively (reviewer-calculated). At the end of the desorption phase, Freundlich $K_{des}$ values were 45.89, 46.19, 28.13, 25.24, and 70.02 for the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively; $K_{oc}$ values ranged from 1097 to 9177. Freundlich $K_{des}$ and $K_{oc}$ values were higher than than those obtained for adsorption.

**Results Synopsis:** Adsorption and desorption values determined using Freundlich isotherm equations. Amounts adsorbed and desorbed were calculated by the reviewer.

Soil type: Bosket silt loam
Amount adsorbed: 29.6-58.7% of the applied
Adsorption $K_{ads}$: 2.43
Adsorption $K_{oc}$: 486
Amount desorbed: 43.96-74.69% of the adsorbed
Desorption $K_d$: 45.89
Desorption $K_{oc}$: 9177

Soil type: Sandy loam
Amount adsorbed: 51.2-86.6% of the applied
Adsorption $K_d$: 5.93
Adsorption $K_{oc}$: 494
Amount desorbed: 14.50-54.74% of the adsorbed
Desorption $K_d$: 46.19
Desorption $K_{oc}$: 3849

Soil type: Loam
Amount adsorbed: 59.0-78.5% of the applied
Adsorption $K_d$: 6.89
Adsorption $K_{oc}$: 313
Amount desorbed: 46.92-67.54% of the adsorbed
Desorption $K_d$: 28.13
Desorption $K_{oc}$: 1278

Soil type: Sandy clay loam sediment
Amount adsorbed: 64.0-74.3% of the applied
Adsorption $K_d$: 8.90
Adsorption $K_{oc}$: 387
Amount desorbed: 58.93-68.12% of the adsorbed
Desorption $K_d$: 25.24
Desorption $K_{oc}$: 1097

Soil type: Panholes silt loam
Amount adsorbed: 47.8-75.3% of the applied
Adsorption $K_d$: 4.93
Adsorption $K_{oc}$: 259
Amount desorbed: 30.91-57.48% of the adsorbed
Desorption $K_d$: 70.02
Desorption $K_{oc}$: 3685

## I. MATERIALS AND METHODS

**GUIDELINE FOLLOWED:** The study was conducted according to U.S. EPA Pesticide Assessment Guidelines Subdivision N, Series §163-1 (October 1982) and the EU Commission Directive 95/36/EC (July 1995). No significant deviations were noted.

**COMPLIANCE:** This study was conducted in compliance with 40 CFR Part 160, EPA GLP and OECD-GLP. Signed and dated GLP, Quality Assurance, Data Confidentiality, and Study Certification statements were provided.

**A. MATERIALS:**

**1. Test Material** Fenamidone

**Chemical Structure:**

**Description:** Not provided

**Purity:** Analytical purity: Not provided
Radiochemical purity: 99.02%
Specific activity: Not provided
Lot/Batch No.: Not provided
Batch No.: CFQ9086 (p. 12)

Locations of the label: Uniformly labeled in the N-phenyl ring

**Storage conditions of test chemicals:** Not provided

**Physico-chemical properties of Fenamidone:**

| Parameter | Values | Comments |
|---|---|---|
| Water solubility | 7 mg/L | |
| Vapour pressure | Not provided | |
| UV absorption | Not provided | |
| $pK_a$ | Not provided | |
| $K_{ow}$ | Not provided | |
| Stability of Compound at room temperature | Not provided | |

Data were obtained from p. 13 of the study report.

## 2. Soil Characteristics

Table 1: Description of soil collection and storage.

| Description | Silt loam | Sandy loam | Loam | Sandy clay loam sediment | Silt loam |
|---|---|---|---|---|---|
| Geographic location | Leland, MS | Iola, Wisconsin | Essex, UK | Essex, UK | Kent, UK |
| Pesticide use history at the collection site | Not provided | Not provided | Not provided | Not provided | Not provided |
| Collection procedures | Not provided | Not provided | Not provided | Not provided | Not provided |
| Sampling depth (cm) | Not provided | Not provided | Not provided | Not provided | Not provided |
| Storage conditions | Not provided | Not provided | Not provided | Not provided | Not provided |
| Storage length | Not provided | Not provided | Not provided | Not provided | Not provided |
| Soil preparation | Sieved, 2 mm | Sieved, 2 mm | Sieved, 2 mm | Sieved, 2 mm | Sieved, 2 mm |

Data were obtained from p. 13 of the study report.

Table 2: Properties of the soils.

| **Property** | **Bosket 96/19** | **Rosholt 96/44** | **Faulkbourne 96/50** | **Sediment 97/07** | **Panholes 97/10** |
|---|---|---|---|---|---|
| Soil Texture | Silt loam | Sandy loam | Loam | Sandy clay loam | Silt loam |
| % sand | 35.80 | 64.17 | 33.50 | 52.30 | 20.90 |
| % silt | 55.97 | 29.11 | 42.63 | 22.70 | 54.79 |
| % clay | 8.23 | 6.72 | 23.87 | 25.00 | 24.31 |
| pH | 6.2 | 6.7 | 7.0 | 8.2 | 8.1 |
| Organic carbon (%) | 0.5 | 1.2 | 2.2 | 2.3 | 1.9 |
| CEC (meq/100 g) | 5.7 | 6.5 | 15.0 | 63.6 | 65.7 |
| Moisture at 1/3 atm (%) | 25.41 | 20.66 | 22.84 | 30.00 | 25.86 |
| Bulk density (lb/cu $ft^3$) | Not provided | Not provided | Not provided | Not provided | Not provided |
| Biomass (mg microbial C/100 g) | Not provided | Not provided | Not provided | Not provided | Not provided |
| Soil taxonomic classification | Fine-loamy, mixed, thermic Mollic Hapludalfs | Coarse-loamy, mixed typic Glossoboralfs | Fine-loamy, mixed, mesic typic Hapludalfs | Not provided | Fine-silty, mixed, mesic typic Eutrochrept |
| Soil mapping unit (for EPA) | Not provided | Not provided | Not provided | Not provided | Not provided |

Data were obtained from Table 1, p. 29, and pp. 126-128 of the study report.

## B. STUDY DESIGN:

**1. Preliminary study:** To determine whether the test substance adsorbed to borosilicate glass tubes, 75 mL of a solution containing 0.7 mg/L of [$^{14}$C]fenamidone in 0.01M $CaCl_2$ were added to two borosilicate screw-capped glass tubes, and the tubes were tightly capped and shaken on an end-over-end shaker in the dark at 20 ± 2° C for 24 hours, and analyzed for total radioactivity using LSC (p. 14). Results showed that fenamidone did not adsorb to the glass tubes; the mean recovery was 104.03% (p. 20; Table 2, p.30).

To determine the soil:solution ratio to be used in the definitive study, soil:solution ratios of 1:10, 1:5 and 1:3 were prepared by adding aliquots of a solution containing 0.7 mg/L of

[$^{14}$C]fenamidone in 0.01M $CaCl_2$ to borosilicate screw-capped glass tubes containing 5, 15, and 20 g (dry weight equivalent) of each test soil and sediment (p. 14). The tubes were capped tightly and shaken by hand to suspend the soil, then shaken on an end-over-end shaker in the dark at 20 ± 2° C for 24 hours. The tubes were removed and centrifuged for 10 minutes at 2,000 rpm. Aliquots of the supernatants were analyzed for total radioactivity using LSC. Soil:solution ratios of 1:5 yielded recoveries of 26.66-57.28% of the applied in the supernatants, and soil:solution ratios of 1:10 yielded recoveries of 44.21-71.94% of the applied the supernatants (p. 20; Table 3, p. 30). The lowest recoveries were obtained using soil:solution ratios of 1:3; 16.19-45.21% of the applied was in the supernatants.

To determine the equilibration time to be used in the definitive adsorption phase of the study, 75 mL of a solution containing 0.7 mg/L of [$^{14}$C]fenamidone in 0.01M $CaCl_2$ were added to borosilicate crew-capped glass tubes containing 15 g (dry weight equivalent) of each test soil and sediment (p. 15). The tubes were shaken on an end-over-end shaker at in the dark at 20 ± 2° C for 1, 2, 4, 5.5, 24, 48, and 94.75 hours. The samples were centrifuged at 2,000 rpm for 10 minutes and triplicate aliquots of the supernatants were analyzed for total radioactivity using LSC. To confirm the stability of fenamidone within the test system, selected samples were analyzed by reverse-phase HPLC (p. 16). Results showed an initial, rapid decrease in radioactivity in the supernatants, that was followed by a gradual decrease, then little change after 48 hours (p. 20; Figure 1, p. 51). HPLC analysis of the supernatants showed some degradation of fenamidone in the sandy loam, loam, and Panholes silt loam soils; 3.90-5.52% of the applied radioactivity was not parent compound (p. 21; Table 4, p. 30).

To determine the equilibration time to be used in the definitive desorption phase of the study, 75 mL of a solution containing 0.7 mg/L of [$^{14}$C]fenamidone in 0.01M $CaCl_2$ were added to borosilicate screw-capped glass tubes containing 15 g (dry weight equivalent) of the test soils and sediment (p. 16). The tubes were shaken on an end-over-end shaker in the dark at 20 ± 2° C for 48 hours. The samples were centrifuged and the supernatants were decanted and replaced with pesticide-free 0.01M $CaCl_2$. The tubes were placed in the dark at 20°C and shaken on an end-over-end shaker for 1, 2, 4, 5.5, and 24 hours. The samples were centrifuged at 2,000 rpm for 10 minutes and triplicate aliquots of the supernatants were analyzed for total radioactivity using LSC (p. 17). In the four test soils and sediment, the amount of radioactivity in solution was similar between 1 hour and 24 hours (p. 21; Figure 2, p. 51). To confirm the stability of fenamidone within the test system, selected samples were analyzed by reverse-phase HPLC (p. 16). HPLC analysis of the supernatants showed some degradation of fenamidone in sandy loam and Panholes silt loam soils; 0.65-1.52% of the applied radioactivity was not parent compound (p. 21; Table 4, p. 30).

Based on the results of the preliminary experiments, it was determined that fenamidone did not adsorb to the glass tubes, and that the definitive study would be conducted using a soil:solution ratio of 1:5, an adsorption phase equilibration period of 48 hours, and a desorption phase equilibration period of 1.5 hours for all test soils and sediment (pp. 20-21).

## 2. Definitive study experimental conditions:

Table 3: Study design for the adsorption phase.

| **Parameters** | | **Bosket silt loam** | **Sandy loam** | **Loam** | **Sandy clay loam sediment** | **Panholes silt loam** |
|---|---|---|---|---|---|---|
| Condition of soil (air dried/fresh) | | Air-dried | Air-dried | Air-dried | Air-dried | Air-dried |
| Have these soils been used for other laboratory studies ? (specify which) | | Yes. MRIDs 45385824, 45385825, 45385826, 45385828 | Yes. MRIDs 45385824, 45385825, 45385826 | Yes. MRIDs 45385824, 45385825, 45385826, 45385828 | Yes. MRIDs 45385824 | Yes. MRIDs 45385824, 45385825, 45385826 |
| Soil (g/replicate) | | 15 g | 15 g | 15 g | 15 g | 15 g |
| Equilibrium solution used (name and concentration; eg: 0.01N $CaCl_2$) | | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ |
| Control used (with salt solution only) (Yes/No) | | No | No | No | No | No |
| Test material concentrations[1] | Nominal application rates (mg/kg) | 17.5, 3.5, 0.7, 0.14 | 17.5, 3.5, 0.7, 0.14 | 17.5, 3.5, 0.7, 0.14 | 17.5, 3.5, 0.7, 0.14 | 17.5, 3.5, 0.7, 0.14 |
| | Analytically measured concentrations (mg/kg) | 14.9, 3.15, 0.6, 0.13 | 15.2, 3.05, 0.65, 0.13 | 15.65, 3.05, 0.6, 0.12 | 15.25, 3.0, 0.6, 0.12 | 15.25, 3.05, 0.6, 0.12 |
| Identity and concentration of co-solvent, if any | | Acetonitrile | Acetonitrile | Acetonitrile | Acetonitrile | Acetonitrile |
| Soil:solution ratio | | 1:5 | 1:5 | 1:5 | 1:5 | 1:5 |
| Initial pH of the equilibration solution, if provided | | Not provided | Not provided | Not provided | Not provided | Not provided |
| No. of replica-tions | Controls | 0 | 0 | 0 | 0 | 0 |

| **Parameters** | | **Bosket silt loam** | **Sandy loam** | **Loam** | **Sandy clay loam sediment** | **Panholes silt loam** |
|---|---|---|---|---|---|---|
| | Treatments | 2 | 2 | 2 | 2 | 2 |
| Equilibration | Time (hours) | 48 | 48 | 48 | 48 | 48 |
| | Temperature (°C) | 20 ± 2 | 20 ± 2 | 20 ± 2 | 20 ± 2 | 20 ± 2 |
| | Darkness (Yes/No) | Yes | Yes | Yes | Yes | Yes |
| | Shaking method | End-over-end shaker | End-over-end shaker | End-over-end shaker | End-over-end shaker | End-over-end shaker |
| | Shaking time (hours) | 48 | 48 | 48 | 48 | 48 |
| Method of separation of supernatant (eg., centrifugation) | | Centrifugation | Centrifugation | Centrifugation | Centrifugation | Centrifugation |
| Centrifugation | Speed (rpm) | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| | Duration (min) | *ca.* 10 | *ca.* 10 | *ca.* 10 | *ca.* 10 | *ca.* 10 |
| | Method of separation of soil and solution | Decantation | Decantation | Decantation | Decantation | Decantation |

Data were obtained from pp. 13 and 18 and Table 5, p. 31 of the study report.

1 Reviewer-calculated by multiplying the concentration (nominal/measured) by the volume of $CaCl_2$ solution used and dividing that number by the amount of soil used in the system (3.5 mg/L x 75 mL = 262.5 mg/15 g soil = 17.5 mg/kg).

Table 4: Study design for the desorption phase.

| **Parameters** | | **Bosket silt loam** | **Sandy loam** | **Loam** | **Sandy clay loam sediment** | **Panholes silt loam** |
|---|---|---|---|---|---|---|
| Were the soil residues from the adsorption phase used? If not, describe the method for adsorption using a separate adsorption Table | | Yes | Yes | Yes | Yes | Yes |
| Amount of test material present in the adsorbed state/adsorbed amount (mg a.i./kg soil)* | 17.5 | 4.347 | 7.486 | 8.946 | 9.459 | 7.017 |
| | 3.5 | 1.199 | 1.966 | 1.880 | 1.972 | 1.651 |
| | 0.7 | 0.264 | 0.493 | 0.395 | 0.423 | 0.396 |
| | 0.14 | 0.072 | 0.111 | 0.092 | 0.085 | 0.089 |
| No. of desorption phases | | 5 | 5 | 5 | 5 | 5 |
| Equilibration solution and quantity used per treatment for desorption (eg., 0.01M $CaCl_2$) | | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ | 0.01M $CaCl_2$ |
| Soil:solution ratio | | 1:5 | 1:5 | 1:5 | 1:5 | 1:5 |
| Replications | Controls | 0 | 0 | 0 | 0 | 0 |
| | Treatments | 2 | 2 | 2 | 2 | 2 |
| Desorption equilibration | Time (hours) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| | Temperature (°C) | 20 ± 1 | 20 ± 1 | 20 ± 1 | 20 ± 1 | 20 ± 1 |
| | Darkness | Yes | Yes | Yes | Yes | Yes |
| | Shaking method | End-over-end shaker | End-over-end shaker | End-over-end shaker | End-over-end shaker | End-over-end shaker |

| Parameters | | Bosket silt loam | Sandy loam | Loam | Sandy clay loam sediment | Panholes silt loam |
|---|---|---|---|---|---|---|
| | Shaking time (hours) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Centrifugation | Speed (rpm) | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| | Duration (min) | 10 | 10 | 10 | 10 | 10 |
| | Method of separation of soil and solution | Not reported | Not reported | Not reported | Not reported | Not reported |
| Second - fifth desorption | Indicate if the method is same as the first desorption step. | Same | Same | Same | Same | Same |

Data were obtained from p. 18 of the study report.

* Means were reviewer-calculated using Excel and data obtained from Tables 8-12, pp. 32-33 of the study report.

**3. Description of analytical procedures:**

**Extraction/clean up/concentration methods:** Following the fifth desorption step, one tube containing each test soil and sediment was extracted with approximately 75 mL of acetonitrile:water (50:50, v:v), then an additional 75 mL of acetonitrile:water (50:50, v:v) was added to each tube (p. 18). The tubes were shaken on a wrist action shaker for 20 minutes, centrifuged at approximately 2,000 rpm for 10 minutes, and the supernatants were removed. Triplicate aliquots (*ca.* 1 g) of each supernantant were removed for analysis using LSC.

**Total $^{14}C$ measurement:** Aliquots of the test solutions, supernatants, and extracts were analyzed for total radioactivity using LSC. The extracted soils were air dried, weighed, ground into a powder and subsamples (0.1-0.3 g) were analyzed by LSC following combustion.

**Non-extractable residues, if any:** Not applicable.

**Derivatization method, if used:** A derivatization method was not employed in the study.

**Identification and quantification of parent compound:** Supernatants analyzed by HPLC were from the high treatment concentration (four soils) or from the mid-high treatment concentration (sediment) concentration. Identification and quantification of the parent compound were performed by HPLC using the following operating conditions: Kromasil 100 5C1 column (4.6 x 100 mm), mobile phase of (A) acetonitrile:water (40:60, v:v) and (B) acetonitrile [percent A:B at 0 min. 100:0 (%), 35 min. 0:100 (%), 38 min. 100:0 (%), 45 min. 100:0 (%)], flow rate 1 mL/minute, with radioactive flow and UV (230 nm) detection (p. 19). The identity of fenamidone was confirmed by chromatographic comparison of the HPLC retention times of unlabelled reference standards.

**Identification and quantification of transformation products, if appropriate:** Identification and quantification of transformation products were not performed.

**Detection limits (LOD, LOQ) for the parent compound:** Detection limits for the parent compound were not provided.

**Detection limits (LOD, LOQ) for the transformation products, if appropriate:** Identification and quantification of transformation products were not performed.

## II. RESULTS AND DISCUSSION

**A. TEST CONDITIONS:** Fenamidone degraded slightly in the four test soils and one sediment; ≤2.53% of the applied radioactivity was not parent compound and did not co-elute with reference standards of fenamidone metabolites (Table 18, p. 44). The temperature was stated to be 25 ±

2°C throughout the study; temperature records were not provided. The only protocol deviation was that the tube solvent-extracted for the sandy clay loam sediment was not from the highest treatment concentration (17.5 mg a.i./kg), but rather from the 3.5 mg a.i./kg treatment (p. 20).

**B. MASS BALANCE:** The mass balance was not reported at the end of adsorption phase of the study. Mass balances were calculated by summing the total amount of fenamidone recovered in the adsorption and desorption solutions, the soil extracts, and unextracted soil residues. Mass balances were 93.02, 92.01, 91.34, 94.61, and 93.10% of the applied for the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively (Tables 19-23, pp. 45-46).

Table 5: Recovery of fenamidone, expressed as percentage of applied radioactivity, in soil after adsorption/desorption (n = 8; mean ± s.d.)[1].

| Matrices | Bosket silt loam | Sandy loam | Loam | Sandy clay loam sediment | Panholes silt loam |
|---|---|---|---|---|---|
| At the end of the adsorption phase | | | | | |
| Supernatant solution | 52.42 ± 10.6 | 26.41 ± 13.4 | 28.96 ± 6.9 | 26.14 ± 3.6 | 33.89 ± 10.6 |
| Solid phase (total $^{14}C$) | Not determined | | | | |
| Total recovery | Not determined | | | | |
| At the end of the desorption phase | | | | | |
| Supernatant solution[2] | 26.81 ± 0.6 | 22.72 ± 7.4 | 42.03 ± 2.6 | 47.45 ± 0.9 | 28.75 ± 3.0 |
| Solid phase (extracted)[3] | --- | --- | --- | --- | --- |
| Non-extractable residues in soil, if measured[3] | 14.72 ± 7.1 | 47.28 ± 17.3 | 21.17 ± 8.6 | 20.94 ± 4.1 | 32.37 ± 11.7 |
| Total recovery | 93.02 ± 3.4 | 92.01 ± 3.7 | 91.34 ± 1.5 | 94.61 ± 2.1 | 93.10 ± 1.5 |

[1] Means and standard deviations were reviewer-calculated using Excel and data obtained from Tables 19-23, pp. 45-46 of the study report.

[2] Values represent cumulative radioactivity in desorption supernatants for all five desorption steps.

[3] Single samples were extracted; the extracted and non-extractable values for these samples are not included in the table. The respective extracted and non-extractable values are 3.45% and 3.74% for the silt loam soil; 7.70% and 14.37% for the sandy loam soil; 6.05% and 8.52% for the loam soil; 9.35% and 12.19% for the sediment; and 4.50% and 12.53% for the silt loam soil.

Table 6: Concentration of fenamidone in the solid and liquid phases at the end of adsorption equilibration period (n = 2; mean ± s.d.)[1]

| Concentration (mg a.i./kg) | Bosket silt loam | | | Sandy loam | | | Loam | | |
|---|---|---|---|---|---|---|---|---|---|
| | on soil (mg a.i./kg)[2] | in solution (µg a.i./mL) | % adsorbed[3] | on soil (mg a.i./kg)[2] | in solution (µg a.i./mL) | % adsorbed[3] | on soil (mg a.i./kg)[2] | in solution (µg a.i./mL) | % adsorbed[3] |
| 17.5 | 4.347 ± 0.0 | 2.073 ± 0.0 | 29.6 ± 0.2 | 7.486 ± 0.1 | 1.451 ± 0.0 | 51.2 ± 0.0 | 8.946 ± 0.0 | 1.256 ± 0.0 | 59.0 ± 0.1 |
| 3.5 | 1.199 ± 0.0 | 0.385 ± 0.0 | 38.0 ± 0.9 | 1.966 ± 0.0 | 0.202 ± 0.0 | 66.3 ± 1.1 | 1.88 ± 0.0 | 0.219 ± 0.0 | 63.5 ± 0.6 |
| 0.7 | 0.264 ± 0.0 | 0.068 ± 0.0 | 44.2 ± 0.6 | 0.493 ± 0.0 | 0.024 ± 0.0 | 80.3 ± 0.7 | 0.395 ± 0.0 | 0.039 ± 0.0 | 67.6 ± 0.6 |
| 0.14 | 0.072 ± 0.0 | 0.010 ± 0.0 | 58.7 ± 0.4 | 0.111 ± 0.0 | 0.003 ± 0.0 | 86.6 ± 0.1 | 0.092 ± 0.0 | 0.005 ± 0.0 | 78.5 ± 0.7 |

| Concentration (mg a.i./kg) | Sandy clay loam sediment | | | Panholes silt loam | | |
|---|---|---|---|---|---|---|
| | on soil (mg a.i./kg)[2] | in solution (µg a.i./mL) | % adsorbed[3] | on soil (mg a.i./kg)[2] | in solution (µg a.i./mL) | % adsorbed[3] |
| 17.5 | 9.459 ± 0.0 | 1.063 ± 0.0 | 64.0 ± 0.6 | 7.017 ± 0.1 | 1.548 ± 0.0 | 47.8 ± 0.9 |
| 3.5 | 1.972 ± 0.0 | 0.192 ± 0.0 | 66.9 ± 0.5 | 1.651 ± 0.0 | 0.259 ± 0.0 | 55.4 ± 0.5 |
| 0.7 | 0.423 ± 0.0 | 0.035 ± 0.0 | 70.6 ± 0.0 | 0.396 ± 0.0 | 0.036 ± 0.0 | 68.6 ± 1.4 |
| 0.14 | 0.085 ± 0.0 | 0.006 ± 0.0 | 74.3 ± 0.5 | 0.089 ± 0.0 | 0.006 ± 0.0 | 75.3 ± 1.1 |

[1] Means and standard deviations were reviewer-calculated using Excel and data obtained from Tables 8-12, p p. 32-33; ; Appendix 3, pp. 92-124 of the study report.

[2] Reviewer-calculated by dividing the soil concentration by treatment rate (4.364 µg/g x 15 g soil ÷ 222.489 µg = 29.4%)

[3] The amount adsorbed was calculated by the reviewer as the difference between the amount applied and the amount in the aqueous phase.

Table 7: Concentration of fenamidone in the solid and liquid phases at the end of desorption (n = 2; total of all desorption phases).[1, 2]

| Concentration (mg a.i./kg) | Bosket silt loam | | | Sandy loam | | | Loam | | |
|---|---|---|---|---|---|---|---|---|---|
| | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed[3] | on soil (mg/kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed[3] | on soil (mg/kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed[3] |
| 17.5 | 1.312 | 0.803 | 74.69 | 3.645 | 0.915 | 54.74 | 3.090 | 1.374 | 67.54 |
| 3.5 | 0.522 | 0.174 | 61.71 | 1.281 | 0.159 | 37.32 | 0.676 | 0.271 | 65.82 |
| 0.7 | 0.134 | 0.033 | 54.28 | 0.399 | 0.022 | 20.86 | 0.167 | 0.05 | 59.26 |
| 0.14 | 0.043 | 0.007 | 43.96 | 0.096 | 0.004 | 14.50 | 0.050 | 0.009 | 46.92 |

| Concentration (mg a.i/kg) | Sandy clay loam sediment | | | Panhole silt loam | | |
|---|---|---|---|---|---|---|
| | on soil (mg/kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed[3] | on soil (mg/kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed[3] |
| 17.5 | 3.19 | 1.452 | 68.12 | 3.343 | 0.938 | 57.48 |
| 3.5 | 0.685 | 0.297 | 66.79 | 0.872 | 0.191 | 51.30 |
| 0.7 | 0.159 | 0.060 | 63.78 | 0.248 | 0.035 | 40.38 |
| 0.14 | 0.036 | 0.011 | 58.93 | 0.064 | 0.006 | 30.91 |

[1] Means were reviewer-calculated using Excel and data obtained from Tables 13-17, pp. 34-43; Tables 24-28, pp. 47-48 of the study report.

[2] Each value in the solid phase is the amount present after five desorption steps, and each value in the solution phase is the total amount desorbed. Total amount in solution following all five desorption steps was reviewer-calculated by summing the amount in solution following each desorption step, e.g., 0.522+0.163+0.064+0.031+0.018.

[3] Total percentage desorbed of the adsorbed following five desorption steps was reviewer-calculated by summing each author provided percentage desorbed as percentage of adsorbed (47.62+15.42+6.10+2.94+1.72% = 73.8%); data were obtained from Tables 24-28, pp. 47-48 of the study report.

Table 8: Freundlich adsorption and desorption constants of fenamidone in the soils.[1]

| Soil | Adsorption | | | | Desorption[2] | | | |
|---|---|---|---|---|---|---|---|---|
| | K | 1/N | $R^2$ | $K_{oc}$ | $K_d$ | 1/N | $R^2$ | $K_{oc}$ |
| Bosket silt loam | 2.43 | 0.781 | 0.998 | 486 | 45.89 | 0.862 | 0.994 | 9177 |
| Sandy loam | 5.93 | 0.687 | 0.999 | 494 | 46.19 | 0.755 | 0.998 | 3849 |
| Loam | 6.89 | 0.833 | 0.997 | 313 | 28.13 | 0.924 | 0.999 | 1278 |
| Sandy clay loam sediment | 8.90 | 0.907 | 1.000 | 387 | 25.24 | 0.960 | 1.000 | 1097 |
| Panholes silt loam | 4.93 | 0.773 | 0.999 | 259 | 70.02 | 0.912 | 0.998 | 3685 |

[1] Data were obtained from Tables 8-17, pp. 32-43 of the study report.
[2] Desorption values following the fifth desorption step.
K - Freundlich adsorption and desorption coefficients; 1/N -Slope of Freundlich adsorption/desorption isotherms.
$K_{oc}$ - Coefficient adsorption per organic carbon ($K_d$ or K x 100/% organic carbon).
$R^2$ - Regression coefficient of Freundlich equation.

**C. ADSORPTION:** After 48 hours of equilibration, 29.6-58.7%, 51.2-86.6%, 59.0-78.5%, 64.0-74.3%, and 47.8-75.3% of the applied fenamidone was adsorbed from the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively (reviewer-calculated). Freundlich $K_{ads}$ values were 2.43, 5.93, 6.89, 8.90, and 4.93 for the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively; corresponding $K_{oc}$ values were 486, 494, 313, 387, and 259 (Table 6, p. 31).

**D. DESORPTION:** At the end of the desorption phase, 43.96-74.69%, 14.50-54.74%, 46.92-67.54%, 58.93-68.12%, and 30.91-57.48% of the adsorbed $^{14}C$ was desorbed from the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively (Tables 24-28, pp. 47-48). Following the fifth desorption step, Freundlich $K_{des}$ values were 45.89, 46.19, 28.13, 25.24, and 70.02 for the Bosket silt loam soil, sandy loam soil, loam soil, sandy clay loam sediment, and Panholes silt loam soil, respectively; corresponding desorption $K_{oc}$ values were 9177, 3849, 1278, 1097, and 3685 (Table 7, p. 31).

**III. STUDY DEFICIENCIES:** The objective of this study was to study the sorptive behavior of fenamidone in four soils and one sediment with varying soil characteristics. None of the study deficiencies noted are considered to be of sufficient concern to cause the study to be judged scientifically invalid. The study fulfills Subdivision N Guideline §163-1.

## IV. REVIEWER'S COMMENTS:

1. Some degradation of fenamidone occurred during the course of the definitive study; ≤2.53% of the applied radioactivity in the supernatants and extracts for all test soils and sediment was not parent compound (p. 25; Table 18, p.44). No degradates co-eluted with the marker compounds used in HPLC analyses. The study author concluded that fenamidone degradation did not significantly affect the study results.

2. Two test soils (Panholes silt loam and loam soils) and the sandy clay loam sediment were foreign in origin. However, these soils and sediment were characterized according to the USDA soil textural classification system and were comparable to soils found in the United States.

3. The 1/n values associated with the Freundlich $K_{ads}$ values for the four test soils were below 0.9; l/n values associated with the Freundlich $K_{ads}$ were 0.687-0.833; for the sediment the Freundlich $K_{ads}$ was 0.907 (study report Table 6, p. 31). If the 1/n value is not within the range of 0.9 to 1.1, then the Freundlich isotherm may not adequately or accurately represent the adsorption of the compound across all concentrations.

4. Sample storage intervals and conditions were not reported. Based on study report Table 31, the adsorption and desorption supernatants were stored for up to 3 days prior to HPLC analysis (p. 50).

5. The study author determined that fenamidone would be expected to have medium mobility in soil, based on the McCall system of classification, and would not be expected to move into deeper soil layers (p. 25). The author added that based on the shape of the isotherms, the mechanisms involved in adsorption and desorption depend on concentration in certain soils and may be dependent on soil type. The adsorption/desorption curves were described as exhibiting "considerable hysteresis" whereby fenamidone is much less readily desorbed once it is adsorbed to a soil. This conclusion is supported by the data, as less of the adsorbed radioactivity desorbed with each desorption step (Attachment 3; Figures 5-9, pp.53-55). In the sandy loam and two silt loam soils, adsorbed fenamidone did not readily desorb, whereas, in the loam soil and pond sediment, some of the adsorbed fenamidone desorbed. For all the test soils and the pond sediment, adsorption was only partially reversible. The study author suggested that "aged" fenamidone would be less mobile in soil based on these observations (p. 25).

6. The amount of fenamidone (μg) adsorbed to the soils and sediment was calculated as the difference between the amount applied and the amount in the supernatant solution.

7. Control samples were not employed in the definitive study.

8. The concentration of the co-solvent acetonitrile was not provided.

9. A sample of pond sediment treated at 3.5 mg ai/kg was extracted instead of one from the highest concentration of 17.5 mg a.i./kg (p. 20). The study author stated that this deviation did not affect the validity of the study results.

10. The study was conducted at a maximum concentration of 3.5 mg/L (17.5 mg a.i./kg), which was reported to be equivalent to 50% of the aqueous solubility as recommended by OECD Guidelines (p. 13).

11. The tables in the study report were computer-generated and the values are rounded values of those held in memory; minor variations in mean and total values were noted (p. 28).

12. The highest recommended label rate for a single application of fenamidone was not reported. Subdivision N guidelines state that if possible, one concentration should be roughly equivalent to the maximum proposed or registered field application rate of the parent compound.

13. Method detection limits were not reported. Both method detection limits and limits of quantitation should be reported to allow the reviewer to evaluate the adequacy of the method.

**V. REFERENCES:** The following references were cited in the study:

United States Environmental Protection Agency Pesticide Assessment Guidelines, Subdivision N, October 18, 1982.

EU Commission Directive 95/36/EC July 1995, amending Council Directive 91/414/EEC.

OECD Method 106, Paris 1981.

McCall, P.J., R.L. Swann, D.A. Laskowski, S.M. Unger, S.A. Vrona, and H.J. Dishburger. 1980. *Bull. Environ Contam. Toxicol.* 24, pp. 190-195.

Burr, C.M. and M.B. Simmonds, in preparation. [$^{14}$C]-RPA 407213: Route of Degradation, Rhône-Poulenc Agriculture Department: 201609.

Burr, C.M. and A.J. McDonald, in preparation. [$^{14}$C]-RPA 407213 Soil Photolysis, Rhône-Poulenc Agriculture Department: 201428.

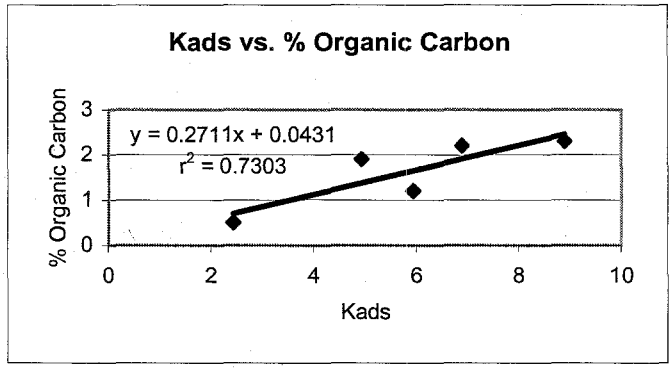
Burr, C.M. and M.B. Simmonds, in preparation. [$^{14}$C]-RPA 407213: Rate of Degradation, Rhône-Poulenc Agriculture Department: 201610.

Attachment 1

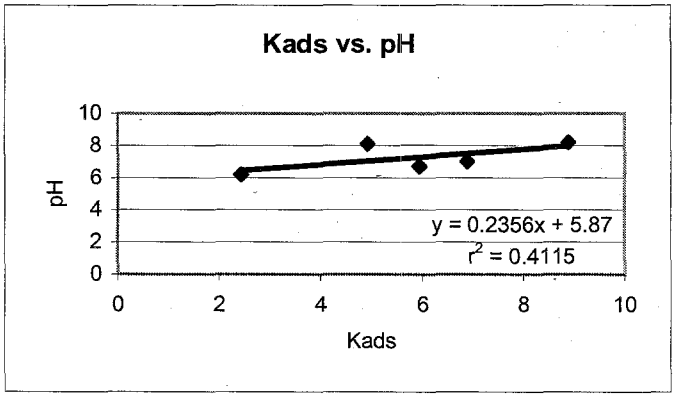
Excel Spreadsheets

| | |
|---|---|
| Chemical Name | Fenamidone |
| MRID | 45385823 |
| Guideline No. | 163-1 |

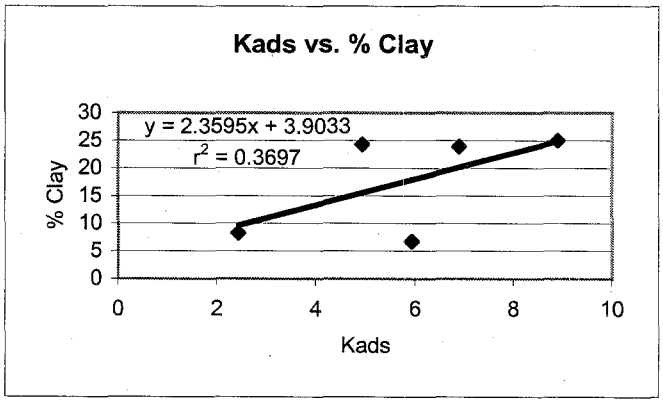
| Soil | Kads | % Organic Carbon |
|---|---|---|
| Silt loam | 2.43 | 0.5 |
| Sandy loam | 5.93 | 1.2 |
| Loam | 6.89 | 2.2 |
| Sediment | 8.9 | 2.3 |
| Silt loam | 4.93 | 1.9 |




| Soil | Kads | pH |
|---|---|---|
| Silt loam | 2.43 | 6.2 |
| Sandy loam | 5.93 | 6.7 |
| Loam | 6.89 | 7 |
| Sediment | 8.9 | 8.2 |
| Silt loam | 4.93 | 8.1 |




| Soil | Kads | % Clay |
|---|---|---|
| Silt loam | 2.43 | 8.23 |
| Sandy loam | 5.93 | 6.72 |
| Loam | 6.89 | 23.87 |
| Sediment | 8.9 | 25 |
| Silt loam | 4.93 | 24.31 |



Chemical Name:Fenamidone
163-1
MRID 45385823

Table 4/6

| Adsorbed | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 4.364 | 7.421 | 8.947 | 9.451 | 6.928 |
| | 3.5 | 4.33 | 7.55 | 8.944 | 9.466 | 7.106 |
| | average | 4.347 | 7.4855 | 8.9455 | 9.4585 | 7.017 |
| | s.d. | 0.024041631 | 0.09121677 | 0.002121 | 0.010607 | 0.125865 |
| | | | | | | |
| | 0.7 | 1.211 | 1.965 | 1.89 | 1.959 | 1.644 |
| | 0.7 | 1.187 | 1.966 | 1.87 | 1.984 | 1.658 |
| | average | 1.199 | 1.9655 | 1.88 | 1.9715 | 1.651 |
| | s.d. | 0.016970563 | 0.00070711 | 0.014142 | 0.017678 | 0.0098995 |
| | | | | | | |
| | 0.14 | 0.265 | 0.486 | 0.394 | 0.426 | 0.398 |
| | 0.14 | 0.263 | 0.499 | 0.395 | 0.419 | 0.393 |
| | average | 0.264 | 0.4925 | 0.3945 | 0.4225 | 0.3955 |
| | s.d. | 0.001414214 | 0.00919239 | 0.000707 | 0.00495 | 0.0035355 |
| | | | | | | |
| | 0.028 | 0.072 | 0.111 | 0.092 | 0.085 | 0.088 |
| | 0.028 | 0.072 | 0.111 | 0.092 | 0.085 | 0.09 |
| | average | 0.072 | 0.111 | 0.092 | 0.085 | 0.089 |
| | s.d. | 0 | 0 | 0 | 0 | 0.0014142 |

Table 5

| Ads. Supernatant | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 64.99 | 44.74 | 36.15 | 30.63 | 46.7 |
| | 3.5 | 64.12 | 44.63 | 36.03 | 30.04 | 47.16 |
| | 0.7 | 57.32 | 30.15 | 31.84 | 28.16 | 39.87 |
| | 0.7 | 56.08 | 31.68 | 32.61 | 27.67 | 39.19 |
| | 0.14 | 51.35 | 18.34 | 28.41 | 24.84 | 26.6 |
| | 0.14 | 50.51 | 17.58 | 29.05 | 24.84 | 28.44 |
| | 0.028 | 37.31 | 12.14 | 19.17 | 21.78 | 21.93 |
| | 0.028 | 37.7 | 12.03 | 18.44 | 21.19 | 21.24 |
| | average | 52.4225 | 26.41125 | 28.9625 | 26.14375 | 33.89125 |
| | s.d. | 10.57006521 | 13.4335874 | 6.867345 | 3.559362 | 10.623089 |

Table 5

| Desorp. Supernatant | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 25.84 | 30.26 | 43.27 | 47.33 | 30.98 |
| | 3.5 | 27.13 | 30.28 | 43.07 | 47.58 | 30.02 |
| | 0.7 | 26.38 | 25.72 | 44.72 | 48.55 | 32.39 |
| | 0.7 | 27.06 | 25.83 | 44.5 | 47.73 | 29.64 |
| | 0.14 | 26.96 | 16.4 | 42.68 | 48.72 | 30.06 |
| | 0.14 | 26.2 | 17.82 | 41.78 | 47.15 | 28.47 |
| | 0.028 | 27.83 | 12.74 | 38.36 | 46.54 | 24.45 |
| | 0.028 | 27.1 | 12.73 | 37.83 | 45.99 | .24 |
| | average | 26.8125 | 22.7214286 | 42.02625 | 47.44875 | 28.75125 |
| | s.d. | 0.633555725 | 7.40251067 | 2.606311 | 0.924453 | 3.0112761 |

Table 5

| Combusted | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | | | | | |
| | 3.5 | 5.79 | 20.55 | 11.46 | 16.46 | 16.27 |
| | 0.7 | 8.69 | 38.55 | 15.11 | 16.74 | 23.42 |
| | 0.7 | 10.89 | 33.62 | 15.89 | 18.12 | 23.16 |
| | 0.14 | 13.98 | 52.03 | 19.42 | 23.67 | 36.39 |
| | 0.14 | 15.9 | 52.98 | 20.11 | 20.24 | 35.03 |
| | 0.028 | 22.91 | 68.96 | 33.47 | 24.92 | 46.34 |
| | 0.028 | 24.9 | 64.24 | 32.76 | 26.41 | 45.97 |
| average | | 14.72285714 | 47.2757143 | 21.17429 | 20.93714 | 32.368571 |
| s.d. | | 7.111295509 | 17.2724143 | 8.647641 | 4.06954 | 11.743746 |

Table 5

| Recovery | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 98.01 | 97.07 | 93.98 | 94.43 | 94.72 |
| | 3.5 | 97.03 | 95.46 | 90.55 | 94.36 | 93.46 |
| | 0.7 | 92.39 | 94.43 | 91.67 | 98.26 | 95.68 |
| | 0.7 | 94.03 | 91.12 | 92.99 | 93.53 | 91.99 |
| | 0.14 | 92.3 | 86.77 | 90.52 | 97.23 | 93.06 |
| | 0.14 | 92.61 | 88.38 | 90.95 | 92.24 | 91.94 |
| | 0.028 | 88.05 | 93.83 | 91 | 93.24 | 92.72 |
| | 0.028 | 89.7 | 89.02 | 89.03 | 93.6 | 91.23 |
| average | | 93.015 | 92.01 | 91.33625 | 94.61125 | 93.1 |
| s.d. | | 3.355311355 | 3.72331649 | 1.544631 | 2.068888 | 1.4943226 |

Table 6

| Solution | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 2.08 | 1.451 | 1.257 | 1.073 | 1.538 |
| | 3.5 | 2.066 | 1.45 | 1.254 | 1.053 | 1.557 |
| average | | 2.073 | 1.4505 | 1.2555 | 1.063 | 1.5475 |
| s.d. | | 0.009899495 | 0.00070711 | 0.002121 | 0.014142 | 0.013435 |
| | 0.7 | 0.389 | 0.197 | 0.216 | 0.193 | 0.261 |
| | 0.7 | 0.381 | 0.206 | 0.221 | 0.19 | 0.257 |
| average | | 0.385 | 0.2015 | 0.2185 | 0.1915 | 0.259 |
| s.d. | | 0.005656854 | 0.00636396 | 0.003536 | 0.002121 | 0.0028284 |
| | 0.14 | 0.068 | 0.025 | 0.038 | 0.035 | 0.034 |
| | 0.14 | 0.067 | 0.023 | 0.039 | 0.035 | 0.037 |
| average | | 0.0675 | 0.024 | 0.0385 | 0.035 | 0.0355 |
| s.d. | | 0.000707107 | 0.00141421 | 0.000707 | 0 | 0.0021213 |
| | 0.028 | 0.01 | 0.003 | 0.005 | 0.006 | 0.006 |
| | 0.028 | 0.01 | 0.003 | 0.005 | 0.006 | 0.006 |
| average | | 0.01 | 0.003 | 0.005 | 0.006 | 0.006 |
| s.d. | | 0 | 0 | 0 | 0 | 0 |

Table 6

| % adsorbed | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 29.4217 | 51.1991 | 58.9593 | 63.5484 | 47.2042 |
| | 3.5 | 29.7488 | 51.2446 | 59.0909 | 64.4127 | 48.4467 |
| average | | 29.5852 | 51.2218 | 59.0251 | 63.9805 | 47.8254 |
| s.d. | | 0.2313 | 0.0322 | 0.0930 | 0.6111 | 0.8786 |
| | 0.7 | 37.3604 | 67.0862 | 63.9637 | 66.5708 | 55.0004 |
| | 0.7 | 38.6092 | 65.4737 | 63.0805 | 67.2527 | 55.7473 |
| average | | 37.9848 | 66.2799 | 63.5221 | 66.9117 | 55.3739 |
| s.d. | | 0.8830 | 1.1402 | 0.6245 | 0.4822 | 0.5281 |
| | 0.14 | 43.8306 | 79.8204 | 68.0170 | 70.6390 | 69.6048 |
| | 0.14 | 44.6570 | 80.7792 | 67.1236 | 70.6100 | 67.5955 |
| average | | 44.2438 | 80.2998 | 67.5703 | 70.6245 | 68.6001 |
| s.d. | | 0.5843 | 0.6779 | 0.6318 | 0.0204 | 1.4208 |
| | 0.028 | 58.9842 | 86.5835 | 77.9661 | 73.9130 | 74.5342 |
| | 0.028 | 58.3784 | 86.6736 | 78.9926 | 74.6487 | 76.0992 |
| average | | 58.6813 | 86.6285 | 78.4793 | 74.2809 | 75.3167 |
| s.d. | | 0.4284 | 0.0637 | 0.7258 | 0.5202 | 1.1067 |

Table 7

| On soil | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 1.358 | 3.611 | 3.07 | 3.18 | 3.249 |
| | 3.5 | 1.266 | 3.679 | 3.109 | 3.2 | 3.437 |
| average | | 1.312 | 3.645 | 3.0895 | 3.19 | 3.343 |
| s.d. | | 0.065053824 | 0.04808326 | 0.027577 | 0.014142 | 0.1329361 |
| | 0.7 | 0.526 | 1.289 | 0.684 | 0.665 | 0.823 |
| | 0.7 | 0.517 | 1.273 | 0.668 | 0.705 | 0.921 |
| average | | 0.5215 | 1.281 | 0.676 | 0.685 | 0.872 |
| s.d. | | 0.006363961 | 0.01131371 | 0.011314 | 0.028284 | 0.0692965 |
| | 0.14 | 0.131 | 1.273 | 0.165 | 0.155 | 0.246 |
| | 0.14 | 0.137 | | 0.169 | 0.162 | 0.249 |
| average | | 0.134 | 1.273 | 0.167 | 0.1585 | 0.2475 |
| s.d. | | 0.004242641 | #DIV/0! | 0.002828 | 0.00495 | 0.0021213 |
| | 0.028 | 0.042 | 0.096 | 0.05 | 0.036 | 0.063 |
| | 0.028 | 0.043 | 0.096 | 0.05 | 0.036 | 0.065 |
| average | | 0.0425 | 0.096 | 0.05 | 0.036 | 0.064 |
| s.d. | | 0.000707107 | 0 | 0 | 0 | 0.0014142 |

Table 7

| Total Solution | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 0.798 | 0.915 | 1.378 | 1.449 | 0.946 |
| | 3.5 | 0.808 | 0.914 | 1.369 | 1.455 | 0.929 |
| average | | 0.803 | 0.9145 | 1.3735 | 1.452 | 0.9375 |
| s.d. | | 0.007071068 | 0.00070711 | 0.006364 | 0.004243 | 0.0120208 |
| | | | | | | |
| | 0.7 | 0.176 | 0.157 | 0.272 | 0.293 | 0.194 |
| | 0.7 | 0.172 | 0.16 | 0.27 | 0.3 | 0.187 |
| average | | 0.174 | 0.1585 | 0.271 | 0.2965 | 0.1905 |
| s.d. | | 0.002828427 | 0.00212132 | 0.001414 | 0.00495 | 0.0049497 |
| | | | | | | |
| | 0.14 | 0.034 | 0.021 | 0.05 | 0.061 | 0.035 |
| | 0.14 | 0.032 | 0.022 | 0.05 | 0.058 | 0.035 |
| average | | 0.033 | 0.0215 | 0.05 | 0.0595 | 0.035 |
| s.d. | | 0.001414214 | 0.00070711 | 0 | 0.002121 | 0 |
| | | | | | | |
| | 0.028 | 0.007 | 0.0037 | 0.009 | 0.011 | 0.0055 |
| | 0.028 | 0.007 | 0.0037 | 0.009 | 0.011 | 0.0055 |
| average | | 0.007 | 0.0037 | 0.009 | 0.011 | 0.0055 |
| s.d. | | 0 | 0 | 0 | 0 | 0 |

Table 7

| %desorbed of adsorb | | Silt loam | Sandy loam | Loam | Sediment | Silt loam |
|---|---|---|---|---|---|---|
| | 3.5 | 73.8 | 54.78 | 67.76 | 68.24 | 58.13 |
| | 3.5 | 75.58 | 54.69 | 67.32 | 68 | 56.82 |
| average | | 74.69 | 54.735 | 67.54 | 68.12 | 57.475 |
| s.d. | | 1.258650071 | 0.06363961 | 0.311127 | 0.169706 | 0.9263099 |
| | | | | | | |
| | 0.7 | 61.82 | 36.82 | 65.61 | 67.58 | 53.86 |
| | 0.7 | 61.6 | 37.81 | 66.03 | 66 | 48.73 |
| average | | 61.71 | 37.315 | 65.82 | 66.79 | 51.295 |
| s.d. | | 0.155563492 | 0.70003571 | 0.296985 | 1.117229 | 3.6274578 |
| | | | | | | |
| | 0.14 | 55.63 | 20.09 | 59.63 | 64.83 | 40.97 |
| | 0.14 | 52.93 | 21.63 | 58.89 | 62.73 | 39.78 |
| average | | 54.28 | 20.86 | 59.26 | 63.78 | 40.375 |
| s.d. | | 1.909188309 | 1.08894444 | 0.523259 | 1.484924 | 0.8414571 |
| | | | | | | |
| | 0.028 | 44.4 | 14.5 | 47.45 | 59.49 | 31.33 |
| | 0.028 | 43.51 | 14.49 | 46.39 | 58.36 | 30.49 |
| average | | 43.955 | 14.495 | 46.92 | 58.925 | 30.91 |
| s.d. | | 0.629325035 | 0.00707107 | 0.749533 | 0.799031 | 0.5939697 |

Attachment 2

Structures of Parent and Transformation Products

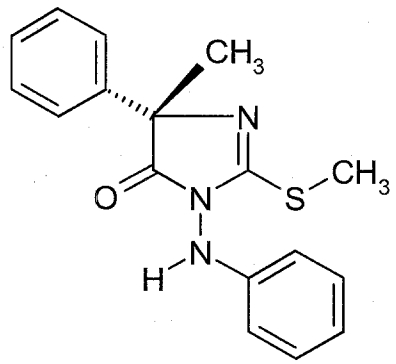
**RPA 407213**

**IUPAC name:** (*S*)-5-Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydroimidazol-4-one
(*S*)-4-Methyl-2-methylthio-4-phenyl-1-phenylamino-5(4H)-imidazolone

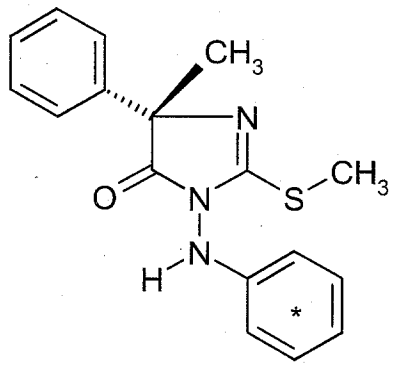
**CAS name**: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-, (S)-

**CAS #:** 161326-34-7

Unlabelled




With radiolabel




*Position of [$^{14}$C]-radiolabel